

Mars 2020 Rover SHERLOC Calibration Target

Trevor Graff¹, Marc Fries², Aaron Burton², Amy Ross³, Kristine Larson³, Dan Garrison¹, Mike Calaway¹, Vinh Tran¹, Roh Bhartia⁴, Luther Beegle⁴; ¹Jacobs, ²JSC/XI, ³JSC/EC, ⁴JPL

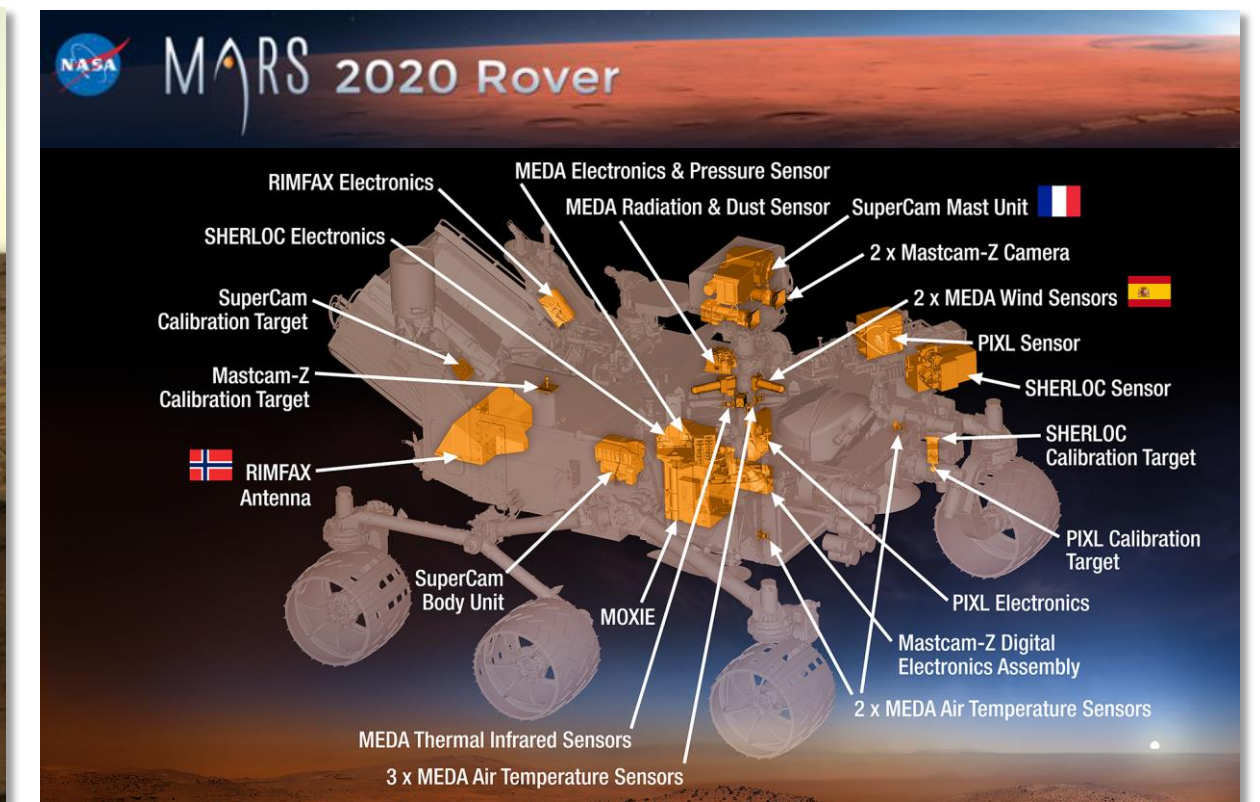
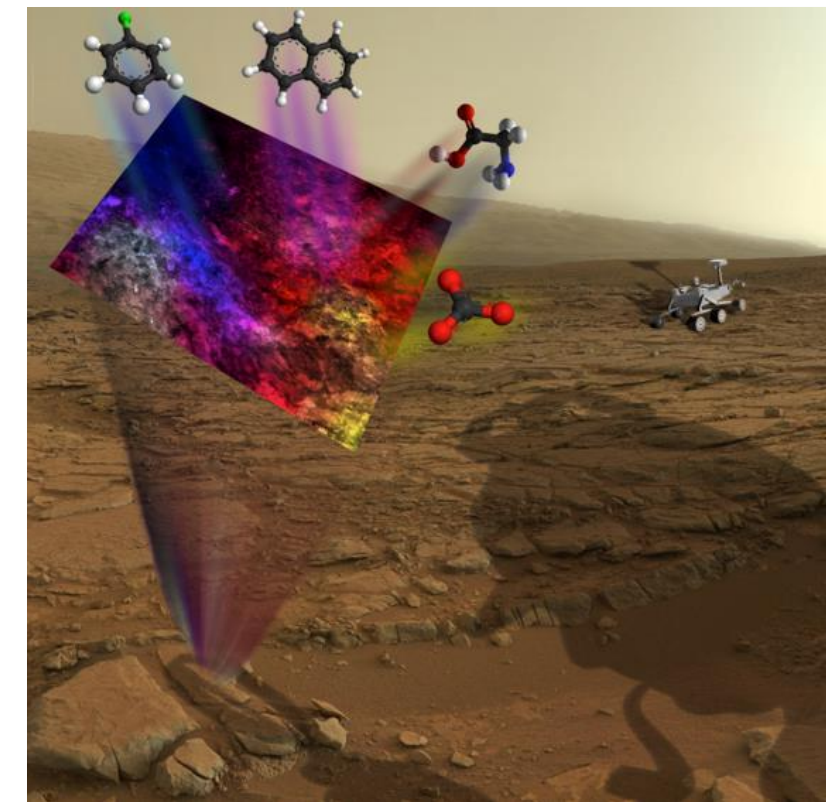
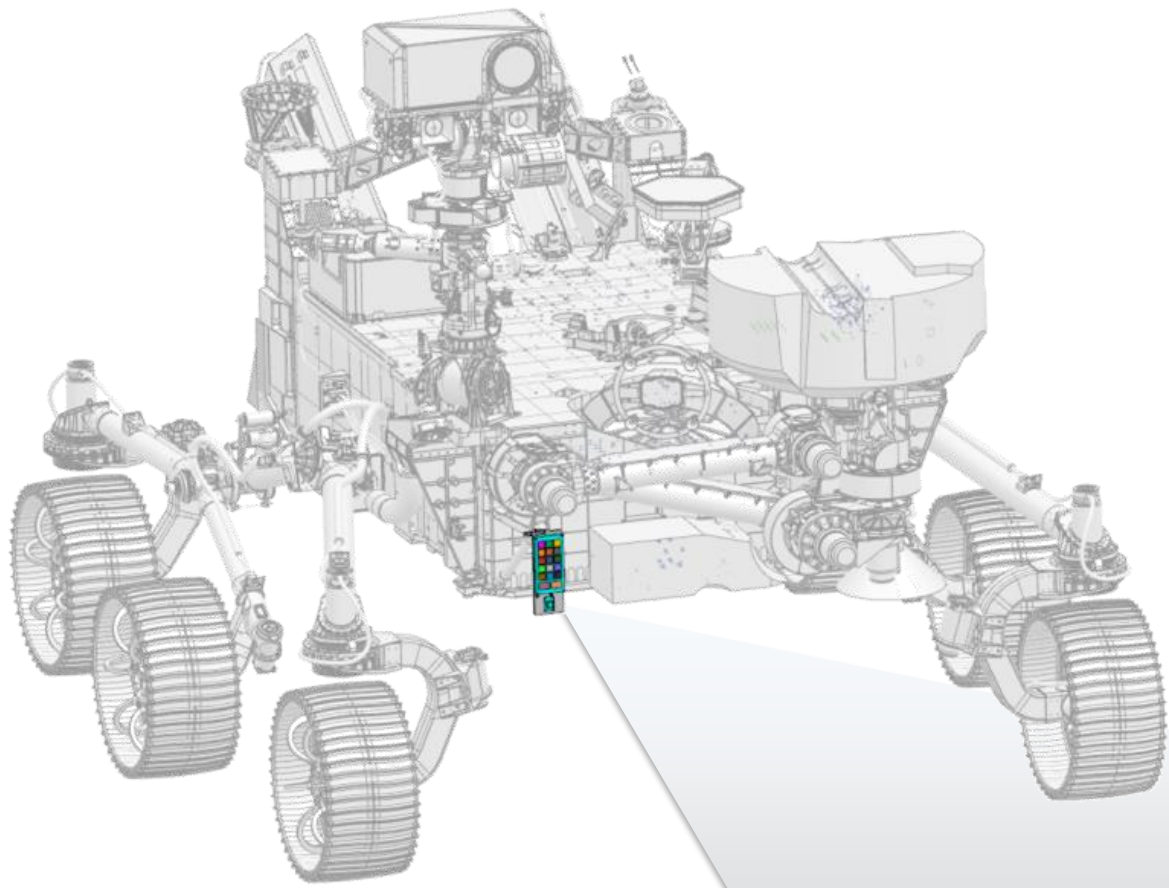
Contact information: trevor.g.graff@nasa.gov (Project Manager / Jacobs) or marc.d.fries@nasa.gov (Project PI / NASA)

OVERVIEW

The Scanning Habitable Environments with Raman & Luminescence for Organics & Chemicals (SHERLOC) instrument is a deep ultraviolet (UV) Raman Fluorescence instrument selected as part of the Mars 2020 rover instrument suite. SHERLOC will be mounted on the rover arm and its primary role is to identify carbonaceous species in martian samples. The SHERLOC instrument requires a calibration target which is being designed and fabricated at JSC as part of our continued science participation in Mars robotic missions. The SHERLOC calibration target will address a wide range of NASA goals to include basic science of interest to both the Science Mission Directorate and Human Exploration and Operations Mission Directorate.

PARTNERSHIPS / COLLABORATIONS

This project is a unique integration of science and engineering across NASA Centers (JSC, JPL) and industry (Jacobs).



INNOVATION

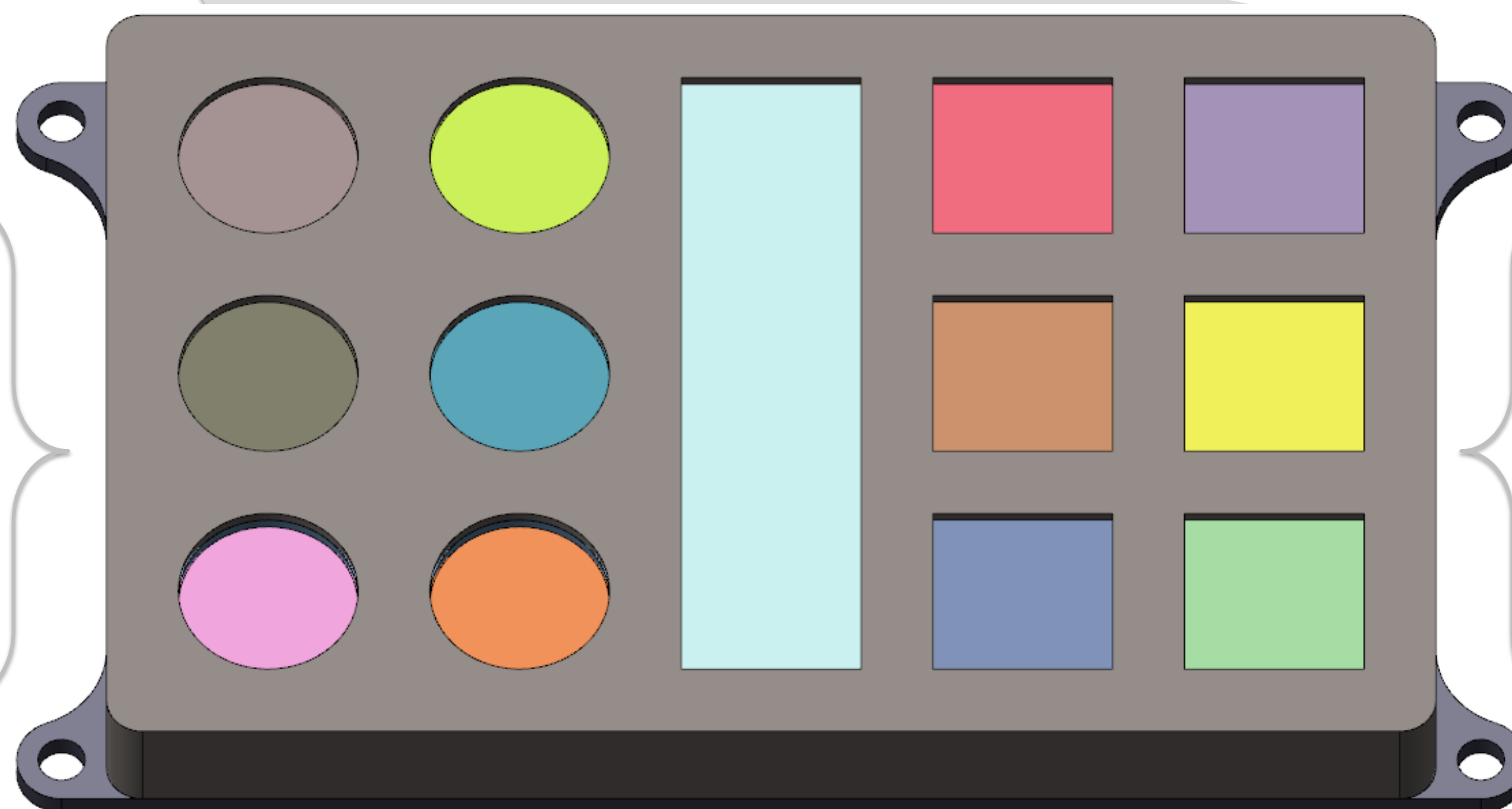
The calibration target will include advanced space suit materials to serve as both calibration targets for the SHERLOC instrument, as well as for testing the resiliency of those materials under martian ambient conditions. A martian meteorite will also be included in the target to serve as a well-characterized example of a martian rock that contains trace carbonaceous material.

OUTCOME / PROJECT SCHEDULE

- Selection of Calibration Target Materials: Jan-Sep 2016
- Preliminary Target Design: Jun-Sep 2016
- Final Design (CDR): Jan 2017
- Fabrication and Environmental Testing: 2017 / 2018
- Completion / Delivery: Feb 2018 (EQM), Oct 2018 (FM)
- Mars 2020 Mission Launch: Jul/Aug 2020

SPECTRAL TARGETS

1. **AlGaIn on SiC**
Raman Calibration (1 of 3)
265 nm emission
2. **Intensity Standard**
Raman Calibration (2 of 3)
800 cm⁻¹ Raman scatter
3. **UV Reflective Mirror**
Raman Calibration (3 of 3)
262.9 nm reflection of 2nd laser line
4. **Gallium Nitride (GaN)**
Fluorescence Calibration
360 nm emission
5. **Spectralon**
Ambient light/Spectral range
Diffuse ambient light reflection
6. **Mars Meteorite**
UV Raman/Fluorescence Map
Education Public Outreach



SUIT MATERIALS

1. **Orthofabric**
Outer layer of Thermal Micrometeoroid Garment (TMG)
2. **Polycarbonate**
Advanced space suit helmet visor
3. **Teflon**
Outer layer of glove; gauntlet
4. **nGimat coated Orthofabric**
New dust resistant coating on outer layer of TMG
5. **Dacron**
Restraint layer
6. **Vectran**
Restraint layer

IMAGING TARGET(S)

- Color (RGB) / Grayscale Target(s)
- Modulation Transfer Function (MTF) / Distortion Target
- Education and Public Outreach (geocache and other graphics)